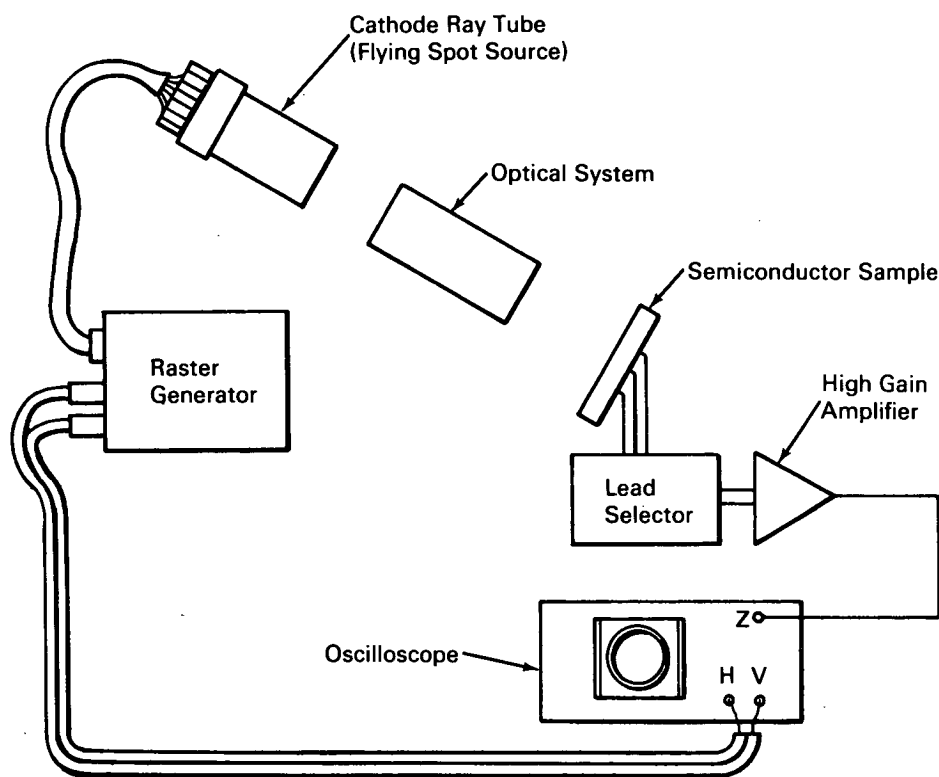


# NASA TECH BRIEF



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## Apparatus Presents Visual Display of Semiconductor Surface Characteristics



### The problem :

To devise an apparatus that will provide a representation of the physicochemical condition of the surface layers of a semiconductor.

### The solution :

An apparatus based on the principle that the surface layers of a semiconductor will conduct an electric current when exposed to a beam of light.

### How it's done :

The apparatus consists of a raster generator that produces a rectangular scanning pattern similar to that of a commercial television set, an optical system, a lead selector that provides an electrical path between any two electrodes positioned on the surface of the semiconductor, a high-gain amplifier, and an oscilloscope. The horizontal and vertical sweep voltages

(continued overleaf)

of the oscilloscope are synchronized with those of the raster generator, and the output voltage from the amplifier is fed to the Z-axis for intensity modulation of the oscilloscope.

As the light beam from the optical system scans the surface of the semiconductor, the instantaneous current between pairs of selected electrodes connected to the semiconductor will vary in accordance with the characteristics of the surface between the electrodes. The variations in the light intensities of the pattern on the oscilloscope correspond to the current variations and permit analysis of the surface layer characteristics of the semiconductor sample with respect to the inversion layer, diffusion voids and excesses, crystal imperfections, and masking problems.

**Note:**

Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Jet Propulsion Laboratory  
4800 Oak Grove Drive  
Pasadena, California, 91103  
Reference: B66-10200

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C., 20546.

Source: Roy A. Summers  
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